

NORTH MAHARASHTRA UNIVERSITY, JALGAON

SYLLABUS FOR F.Y.B.Sc. (MATHEMATICS)

(WITH EFFECT FROM JUNE, 1992)

PAPER - I : CALCULUS

FIRST-TERM :-

- 1] Continuity of function of a real variable, properties of a continuous functions on closed and bounded intervals namely
 - a) Boundedness
 - b) Attains its bounds
 - c) Intermediate value theorem.
- 2] Differentiability of a function of one variable, mean value theorems, indeterminate forms, L-hospital's rule (without proof)
- 3] Successive differentiation. Leibnitz's rule
- 4] Taylor's and Maclaurin's theorems, expansion of e^x , $\cos x$, $\sin x$, $\log(1+x)$, $(1+x)^m$ m is any rational as indefinite series (Assuming $R_n \rightarrow 0$). Maxima, minima using Taylor's theorems.

SECOND-TERM :-

- 5] Integration as antiderivative methods of Integrations
 - a) Integration by substitution
 - b) Integration by parts
 - c) Integration by partial fractions
 - d) Integration of irrational algebraic functions.
- 6] Reduction formula $\int_0^{\pi/2} \sin^m x \cos^n x dx$, $\int_0^{\pi/2} \frac{\sin x}{\sin x} dx$ ($n > 1$).
- 7] Definite integral as a limit of a sum. Applications of Integration. Area of plane regions. Rectification, volume and surface area of revolution.
- 8] Numerical integration. Trapezoidal rule.
Simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rules.

PAPER - I : MATRICES & DIFFERENTIAL EQUATIONS

FIRST - TERMS MATRICES

- 1] Adjoint of a square matrix.
Inverse of a square matrix: Existence & uniqueness.
Inverse by Adjoint method (up to order 3)
- 2] Rank of a matrix: Elementary matrices, Reduction to normal form. Definition of rank of matrix, Invariance of rank of a matrix through elementary transformations

Theorem $\rho(AB) \leq \min \{ \rho(A), \rho(B) \}$
- 3] Linear Equations:
 - i) Homogeneous system
 - ii) Non-homogeneous system : consistency & solutions.
- 4] Quadratic Forms:
 - i) Congruent transformation
 - ii) Reduction to canonical form, signature, Index
 - iii) Definite, semidefinite and Infinite forms.

SECOND - TERM : DIFFERENTIAL EQUATIONS

- 1] Differential equations of the first order and first degree: variables separable, Homogeneous & non-homogeneous equations, Exact equations, Integrating factors, linear equations, equations reducible to linear form
- 2] Equations of First Order and Higher Degree:
 - i) Solvable for x
 - ii) Solvable for y
 - iii) Solvable for p
 - iv) Clairaut's form
- 3] Orthogonal Trajectories

(3)

PAPER - III (A) : GEOMETRY FIRST TERM

- 1] Change of axes: Translation & rotation, Invariants, classification of conics, Reduction of general equation of second degree in x & y to the standard form.
- 2] Co-ordinates of a point in space: distance formula, section formula, change of origin (Revision)
lines: direction cosines, direction ratios, symmetric and parametric equations of a line, Angle between two lines, distance of a point from a line.
Planes: General equation of a plane, intercept form, Normal form, line as intersection of two planes, distance of a point from a plane angle between (i) two plane (ii) a line and a plane skew lines: shortest distance

SECTION - TERM

- 1] Sphere : General & standard equation, section of a sphere by a plane condition of tangency, intersection of two spheres, power of a point Radical plane
- 2] Cylinder: Definition & Equations, Enveloping cylinder, right circular cylinder
- 3] Cone: Definition, cone with a given vertex and guiding curve, right circular cone.
- 4] Conicoids: Standard form, tangent plane, condition of tangency, normal line

(4)

F.Y.B.Sc.

PAPER - III (B) : DISCRETE MATHEMATICS

FIRST - TERM :-

- 1] Sets: Relations and functions. (revisions). Equivalence relations, equivalence classes, partition of a sets.
- 2] Logic: Statement and compound statement, conjunction, disjunction, negations, propositions, and truth tables, tautologies, contradictions, logical equivalence. Algebra of propositions, conditional and biconditional statement, arguments, logical implications, quantifiers.
- 3] Boolean algebra: Lattices and algebraic systems, principal of duality, basic properties of algebraic systems defined by lattice, distributed and complimented lattice. Boolean lattice and Boolean algebra. Uniqueness of finite Boolean algebra, Boolean function and Boolean expressions. Propositional calculus design and implimentation of digital networks.

SECOND - TERM : GRAPH THEORY

- 1] Introduction: Graph, finite and infinite graphs. Incidnece and degree. Isolated vertex, pendant vertex and null graph, complete graph regular graph.
- 2] Paths and circuits: Isomorphism, subgraph, walk paths and circuits components connected graph, disconnected graph, Eulers graph, operations on graph, Hamiltonian paths and circuits. The travelling salemen problem.
- 3] Cut-sets and cut-vertices: Cut-sets, some properties of a cut-set. All cut set in a graph fundamental circuits and cut-sets.
- 4] Trees and Fundamental Circuits: Trees, some properties of terees. Distance and centres in a tree. Rooted and Binary trees, spanning trees. Fundamental circuits. Finding all spanning trees of a graph.
- 5] Matrix Representation of graph: Incidence matrix. Adjacency matrix, circuit matrix. Planer and colouring.
- 6] Directed graphs: Directed graph, types of digraphs. Binary relations. Directed paths and connectedness, trees with directed edges, adjacency matrix of a digraph.

(5)

COMPUTER SCIENCE

TERM - I

SECTION - I

INTRODUCTION TO COMPUTERS.

13	Introduction: History, Block-diagram, Bus structure, Generations and Types (Mini, Micro, Mainframe, Super), Definition of software, hardware, Advances, differences & limitations in Today's Computer System, Applications: Engineering, Scientific, Commercial, Space, Communication, Education, DTP (Desktop Publishing.)	-7
23	Algorithms: Definition of Algorithms & flowchart, Developing algorithm & flowcharts.	-3
33	Memory: Memory cell, Block Diagram, Parameters, RAM, ROM, PROM, EPROM, Volatile & Nonvolatile semi. memory, Magnetic core, Magnetic Bubble Memory.	-6
43	I/O Devices: Punch card, paper-tape, TTY, Printers (Chain, Serial Plotter, Laser), Graphic display devices, hard-disk, floppy-disk (Sector, Cylinder, Track, Seek-time, Latency time), Magnetic type, Character Readers, CRT.	-12
53	Data Representation: Numbering System (Binary, Hex, Octal), ASCII & EBCDIC character coding, Error Detecting, correcting codes, parity bit, Hamming code.	-6
63	Operating Systems: Need, definition, Types (single user, multiuser, Time sharing, Real time, Batch mode etc).	-5
73	Main Features of DOS & commands.	-3

REFERENCES:

- | | | | |
|----|--|---|-------------------------------|
| 1. | Fundamentals of Computers. | : | By Rajaraman |
| 2. | Computers Today. | : | By Sanderson |
| 3. | MS-DOS Manual | | |
| 4. | Computer Studies | : | By C. French |
| 5. | Computer & Common Sense. | : | By. Hunt. J. Shelly |
| 6. | An Introduction to Digital Computer Design | : | By Rajaraman & Radhakrishnan. |

(6)

TERM - I : SECTION - II

PAPER : PROGRAMMING IN C (I)

- 13 scope of language. Distinction & similarities with other higher level & lower level languages, Special features and application areas. (a discussion). -3
- 23 Types, Operators & expressions: variable names, data types & sizes, constants, declarations, arithmetic operators, relational & logical operators, type conversions, increment & decrement operators, Bitwise logical operators, conditional expressions, precedence & order of evaluation. - (10)
- 33 Input & Output : Standard Input & output, Formatted Output-printf, Variable length Arguments lists, Formatted Input-scanf - (5)
- 43 Control flow: Statements & blocks, if-else, else-if, switch, loops- while & for, do-while, break, continue, goto & labels. - (10)
- 53 Functions & Program structures- Basics, functions returning non-integers, scope on function arguments, external variables, scope rules, static variables, register variables, block structure, initialization, recursion, the C-preprocessor - (15)

REFERENCES :

1. The C Programming Language : By Kernighan & Ritchie.
2. Programming in C. : By Kochan
3. C made easy : By Herbert

TERM - I

LAB. WORK

1. Demonstration on booting of system & Familiarity with peripheral devices.
2. DOS command-dir, type, copy, erase, re name, print & Introduction to Turbo-C editors.
3. i) Find the compound & simple interest
ii) Check the no. is PALINDROME or not.

(7)

4. i) Roots of quadratic equation.
ii) To generate 20 terms of fibonacci.
5. i) Generate all prime nos. in the given range.
6. i) Read given numbers in words (937-Nine Hundred Thirty Seven).
7. i) Sum of series (sin, cos).
8. i) To find Factorial of any Number
9. i) Matrix Multiplication.
ii) Matrix Transpose.
10. i) Demonstration on FORMAT, DISKCOPY, AUTOEXEC.BAT, XCOPY, BACKUP, RECOVERY.

TERM : II

SECTION : I

Dbase3 + & Packages

- 1] Work Processing: Create document & nondocument files, Print using different options- Underline, Boldface etc. -4
- 2] DBASE II+ :
 - i) Managing Database.
 - a) Create record structure.
 - b) Adding data.
 - c) View & edit data structure. -1
 - ii) Searching & Sorting Databases.
 - a) Locating Records with conditions.
 - b) Sort & index. -2
 - iii) Report Generation
 - a) Create, modify & print Reports.
 - b) Totalls & subtotals. -3
 - iv) Arithmetic with database
 - a) Counting no. of records.
 - b) Date Arithmetic. -2
 - v) Use of multiple files.
 - a) Master file updation.
 - b) Setting relations.
 - c) Database summary. -3

- vi) Programming.
- a) Variable declaration.
 - b) Math function.
 - c) Conditional statements
 - d) Loop Constructs.
 - e) Input, Output.
 - f) Formatted screen display. -10

Note : Commands to be covered:

ACCEPT, APPEND, AVERAGE, BROWSE, CHANGE, CLEAR, CLOSE, CONTINUE, COPY, COUNT, CREATE, DISPLAY, DO, EDIT, ERASE, FIND GO TOP/BOTTOM, INDEX, INSERT, JOIN, LIST, L LABEL, LOCATE, MEMORY, MODIFY, PACK, PRINT, QUIT, RECALL, REINDEX, RELEASE, RENAME, REPLACE, REPORT, RESTORE, RUN, SAVE, SEEK, SELECT, SET, SORT, STORE, SUM, TOTAL, TYPE, USE, UPDATE, WAIT, ZAP.

Function to be covered:

BOF(), CHR, CMONTH, CALL, CTOD, DATE, DAY, DELETE, DTOC, EOF(), INT, LEN, LOG, LOWER, MONTH, RECNO(), TIME, TRIM, VAL, YEAR

Programming Constructs to be covered:

IF ELSE ENDIF, DO CASE, ENDCASE, DO WHILE, ENDDO, SKIP, RETURN.

3>

LOTUS:

- i) Introduction : Getting started with simple worksheet, entering simple text & formulate with simple worksheet commands, File save, Retrieve options. -2
- ii) Worksheet commands: Insert, Delete, Global., Range, Status, Titles, Window, Copy, move. -2
- iii) Worksheet Functions & Utilities: Mathematical functions, Statistical functions. -1
- iv) Data Commands : Distribution, Query, Sort, Tables. -2
- v) Graph Commands: Types, Names, View, Options, Print-Utility. -2

REFERENCES

1. Understanding DBASE3+ : By Alan Simpson.
2. Mastering DBASE3+ : By Carl Townsend.
3. Mastering 123 : By Carolyn Jorgerson.
4. Understanding Wordstar :

PROGRAMMING IN C/C++

- 1] String function, memory management, graphics function. Pointers & Arrays: Pointers & address, Pointers & function arguments, Pointers & arrays, Address Arithmetic, character pointers & function, multidimensional array, pointers, arrays pointer to pointers, initialisation of pointer arrays, pointers v/s multidimensional arrays, command line arguments, pointer to function. -(15)
- 2] Structure, Union, Typedef : Basic structure, pointer to structure, nested structure, self-referential structures, fields union, typedef. -(5)
- 3] File Handling: Sequential file handling, Expected to be covered problems on file creation & access, some miscellaneous functions. -(15)
- 4] Graphics:
Graphics Functions: circle(), ellipse(), initgraph() line()
etc. -(3)

REFERENCES

1. The C Programming Language : By Ritchie & Kerninghan
2. Programming in C. : By Kochan.
3. C Reference Manual.

LAB WORK - II

C-LANGUAGE.

- 1] Create result-file for six subjects & using the file print mark sheets, (Use C-Language).

WORDSTAR

Using WORDSTAR commands, prepare application letter.

DBASE III+

- 1] Create data bases files with following feilds & enter 5 records each.

file Name: LIB

file name: BORROW

Book Title

Borrow Code (T/S)

Book no

Book no

Section code

Issue date

Subject code

(T: Teachers, S:Students)

You are required to match the two files & print report of no. of books borrowed by teachers & students. Also print a report for overdue books. One week time is given for returning books for students & 4 weeks for the teachers.

- 2] Find the Gross annual salary & find the Taxable income according to the following rules:
1. Gross Annual salary = Basic + DA.+ City Allowance.
 2. Deduct the annual Profession Tax from Gross giving Net Salary.
 3. Deduct from net slary 33% of net or 12,000 whichever is less.
 4. Deduct Rs. 8,000 as standard deduction.

LOTUS

- 1] Prepare sales survey report using 123.

JBB/17192